This questionnaire is used to determine high performance computing (HPC) requirements for the DoD community so that the High Performance Computing Modernization Program (HPCMP) can provide an HPC infrastructure to address those requirements. **Information gathered in this survey has a direct effect on the acquisition and availability of HPC resources to the DoD Services and Agencies, including those required by your project. The information provided in this questionnaire may also be used to help determine allocations at the shared resource centers. Please fill it out as completely as possible.** The HPC Modernization Office appreciates your time and effort in completing the survey.

The goal of this exercise is to determine actual DoD HPC requirements; thus, do not feel constrained by the level or type of HPC resources you think will be available. If you tell us that all you need is resources that the program has, that is all you will ever get. Limit your requirements, however, to a level commensurate with your project's personnel and budgetary resources and reasonable, efficient scientific, engineering, or analytical progress. For the purposes of this questionnaire, HPC includes computational requirements of at least one gigaflops peak performance to solve a single computational problem within the time frame allowed by the particular problem. Other considerations such as memory, storage requirements, and required turnaround time may also characterize computing requirements as high performance. All fields in **bold** require input.

DoD HPC 2000 Requirements Questionnaire

I. Computational Project and Organization:

Directions: A computational project is defined as an effort to solve similar computational problems using similar methods under common management. Large projects should be broken down into smaller, more homogeneous projects (typically 1-25 users). The title should convey a concise description of the project and contain no acronyms. Do not use the name of a Computational Technology Area (CTA) as your project title (see page 4 for the list of CTAs). Provide the full name of the computational project leader. This is the person who is responsible for the project and can answer any questions the HPC Modernization Office (HPCMO) may have about the project. An alternate should also be listed. **If neither the project leader nor the alternate is a Federal employee, include information for the Government Sponsor.** Be sure to provide the phone numbers (including area code), DSN numbers (where applicable), fax numbers (including area code), and e-mail addresses. It is important that the project leader provides the HPCMO with a complete mailing address, including office code, suite number, and zip code.

1. Computational Project Title: ____

2. Computational Project Leader: ____

3. Alternate: ____

4. Government Sponsor: ____

	Leader	Alternate	Government Sponsor
5. Phone Number:	(____) ___________	(____) ___________	(____) ___________
6. DSN Number:	_______________	_______________	_______________
7. Fax Number:	(____) ___________	(____) ___________	(____) ___________

8. E-Mail Address: ________________________________(Leader)

________________________________(Alternate)

________________________________(Government Sponsor)

9. DoD Organization: ________________________________

10. Mailing Address: ____
____
____
____

11. Number of HPC users in computational project:

Directions: A user is defined as a person who spends a significant amount of time performing HPC computations. Users should be counted on only one project, even though they may participate in several projects at their site.

	U.S. Citizen	Non-U.S. Citizen
Government personnel:	_____	_____
On-site contractors:	_____	_____
Off-site contractors:	_____	_____
Total:	_____	_____

12. RDT&E Activity:

Directions: Choose all of the following RDT&E categories that apply to your computational work under this project.

RDT&E Activity	**Applies to your project (Check all that apply)**
Basic Research (6.1)	
Exploratory Development (6.2)	
Advanced Development (6.3)	
Developmental Test and Evaluation	
Operational Test and Evaluation	
Acquisition Program Support	
Other (please specify)	

13. Provide a concise technical description of your project and include a brief summary of your accomplishments and the goals you are trying to achieve. Please provide a rationale for any large increases in requirements for the out-years (exceeding an approximate growth factor of 1.5 per year). This is important information that will be used to project technology needs for the HPCMP for future years.

14. Are any of these HPC requirements likely to lead to cost savings/avoidance for the DoD (such as testing, training and evaluation activities with modeling and simulation)?

____ Yes ____ No If yes, please explain.

15. In the table below please indicate how many users on your project use the following systems to access and interact with HPC systems offered by the DOD HPC Modernization Program

System	Number of Users
UNIX Workstation	
PC running Linux	
PC running Windows95	
PC running Windows/NT	
Macintosh	
Other (specify):	

16. Is this project scheduled to end? ___ Yes ___ No

If so, provide end date: _________

Will this project be replaced by another project? ___ Yes ___ No ___ Uncertain

17. Computational Technology Areas (CTAs):

Directions: Indicate, using a percentage, all of the CTAs associated with your work (see pages 15 – 17 for complete descriptions). Highlight only those CTAs that your work impacts, e.g., if you use an ocean model (CTA 5) as a submodel of a forces simulation model (CTA 7), do not list CTA 5 for this project. If your work is associated with just one CTA, place an 'x' in the primary column and 100 in the % column. If your work is associated with more than one CTA, specify the primary CTA with an 'x' in the primary column and record all of the percentages (primary and secondary) in the middle column.

CTA	%	Primary
1. Computational Structural Mechanics (CSM)		
2. Computational Fluid Dynamics (CFD)		
3. Computational Chemistry and Materials Science (CCM)		
4. Computational Electromagnetics and Acoustics (CEA)		
5. Climate/Weather/Ocean Modeling and Simulation (CWO)		
6. Signal/Image Processing (SIP)		
7. Forces Modeling and Simulation/C4I (FMS)		
8. Environmental Quality Modeling and Simulation (EQM)		
9. Computational Electronics and Nanoelectronics (CEN)		
10. Integrated Modeling and Test Environments (IMT)		
11. Other (specify)		

18. Please check the computational function(s) that pertain to your computational project (see page 18 for definitions of the computational functions):

___ Non-Real-Time Computing (NRTC) (complete pages 5 and 6; then continue with page 10)

___ Real-Time Computing (RTC) (complete pages 7, 8, and 9; then continue with page 10)

___ Other (If your project does not fall into one of the two areas above, please explain why. Then review the tables on pages 5, 7, and 8 and if any represent your computational project, please complete them. (Continue with page 10))

Non-Real-Time Computing

Individual Job Requirements

Directions: The table below asks you to indicate your projected FY 2001 requirements for an individual job. Please indicate which HPC system you expect to use most often and then complete the table for that system. We ask you to identify a minimum, maximum, and average number for each of the indicated categories over the whole set of jobs you run for a year. Note that memory is requested as total memory in gigabytes and file size encompasses total gigabytes of secondary storage needed on a job for input, output, and temporary files.

HPC system expected to be used most often: ___________________________

	Number of Processors	Total Memory (GB)	File Size (GB)
Minimum			
Average			
Maximum			

Overall Performance Requirements for Non-Real-Time Computing

Directions: The table below represents your total performance requirements for all HPC systems that you plan to use. List each specific system (speed already provided for systems available at HPCMP centers) or generic system (speed in gigaflops) and the level of security classification. **If you do not have a preference for a particular site, then only indicate the system(s) required. On each line, indicate the number of processor hours required for each indicated year.** Do not feel constrained by currently available HPC resources; this should be an indication of requirements regardless of resource availability. You should, however, limit your requirements to a level commensurate with your project's personnel and budgetary resources and reasonable, efficient scientific, engineering, or analytical progress. * **These are some of the most important tables of the questionnaire and should not be left blank. *** These tables provide overall HPC requirements that are presented in the final analysis document and may be used when determining resource allocation, so it is important that FY 2001 requirements be presented in terms of specific systems, if at all possible. **If your project is not scheduled to end, please indicate your requirements for all future years indicated in the table.**

Overall Performance Requirements

Specific Site and System[1]		Speed per Processor (GF)	FY01 (processor hrs)	FY02 (processor hrs)	FY04 (processor hrs)	FY06 (processor hrs)	Level of Security Classification
Other Specific System	**OR**	Generic System Speed					

[1] For a listing of available HPCMP Systems, see page 19.

To what extent are the systems that you are requesting able to efficiently run your applications?

Very well	☐	Fairly well	☐
Well	☐	Not well at all	☐

Are you requesting these systems based on their. . . . . ?

Availability	☐	Both	☐
Suitability to your application	☐	Neither	☐

Real-Time Computing

Individual Event Requirements

Directions: The table below asks you to indicate your projected FY 2001 requirements for an individual event. Please indicate which HPC system you expect to use most often and then complete the table for that system. We ask you to identify a minimum, maximum, and average number for each of the indicated categories over the whole set of jobs you run for a year. Note that memory is requested as total memory in gigabytes and file size encompasses total gigabytes of secondary storage needed on a job for input, output, and temporary files. The response time is the maximum time that the HPC system can take to respond to the data stream. Provide the total I/O data rate to or from the system in megabits per second, or alternatively, a data rate requirement in transactions per second.

HPC system expected to be used most often: ___________________________

	Number of Processors	Total Memory (GB)	File Size (GB)	Response Time (sec)	Total I/O Data Rate (Mbps)	**OR**	Transactions per Second
Minimum							
Average							
Maximum							

Do you anticipate a requirement to support multiple events simultaneously? ____ Yes ___ No

If yes, what is the maximum number of events you anticipate supporting at one time? ___________

How many programs are typically supported in one fiscal year? _________

What is the average length (months) of a typical program supported by your project? ___________

What is the average number of events per week during a typical program? _________

Overall Performance Requirements for Real-Time Computing

Directions: The table below represents your total performance requirements for all HPC systems that you plan to use. List each specific system (speed already provided for systems available at HPCMP centers) or generic system (speed in gigaflops) required and the level of security classification. **If you do not have a preference for a particular site, then only indicate the system(s) required. On each line, indicate the number of dedicated hours required on the stated number of processors or system size for each indicated year.** Do not feel constrained by currently available HPC resources; this should be an indication of requirements regardless of resource availability. You should, however, limit your requirements to a level commensurate with your project's personnel and budgetary resources and reasonable, efficient scientific, engineering, or analytical progress. ***These are some of the most important tables of the questionnaire and should not be left blank.** * The information provided in this table should be consistent with those given on the previous page. These tables provide the overall HPC requirements that are presented in the final analysis document. **If your project is not scheduled to end, please indicate your requirements for all future years indicated in the table.**

Overall Performance Requirements

Specific Site and System[2]	Speed per Processor (GF)	Number of Processors	FY01 (system hrs)	FY02 (system hrs)	FY04 (system hrs)	FY06 (system hrs)	Level of Security Classification
Other Specific System **OR**	Generic System Speed						

[2] For a listing of available HPCMP Systems, see page 19.

To what extent are the systems that you are requesting able to efficiently run your applications?

Very well	☐	Fairly well	☐
Well	☐	Not well at all	☐

Are you requesting these systems based on their. . . . . ?

Availability	☐	Both	☐
Suitability to your application	☐	Neither	☐

Data Storage Requirements

Directions: Indicate your total data storage requirements in the table below. "Data Storage" refers to the total gigabytes required to store at a remote center for any period of time during an entire year. Note that data storage requirements are requested in gigabytes. Use one line for each level of classification. **If your project is not scheduled to end, please indicate your storage requirements for all future years indicated in the table.**

What are your total data storage requirements (GB) during each of the indicated years?

	FY01	FY02	FY04	FY06	Level of Security Classification
Data Storage (GB)					
Data Storage (GB)					
Data Storage (GB)					
Data Storage (GB)					
Data Storage (GB)					

III. Software Requirements:

Directions: Indicate the number of users associated with this computational project who plan to use any HPC applications software and software tools for both unclassified and classified computations in FY 2001. Also indicate the number of users requiring training on any HPC applications software and software tools. **This number should not be greater than the number of users indicated on page 2. If the software application requires use by more than one HPC system, please use separate lines for each system. If a particular piece of software is required on all HPC systems for which you have requirements, you may indicate this on a single line by specifying "All."** Please also use separate lines for different security classifications. Remember to include both off-the-shelf software (i.e., commercial or Government owned), as well as public domain applications.

* **These are some of the most important tables of the questionnaire and should not be left blank.** *

Software Requirement	Users of Software	Users Requiring Training on Software	HPC System Requiring Software	Level of Security Classification of Software Use
Large Scale Analysis Software:				
Visualization Packages:				
Functional Libraries:				
Small Scale Multi-Purpose Software:				
In-House Applications:				
Compilers/Languages:				
Software Tools:				

Which of these HPC system attributes are required by your principal applications (check all that apply):

- ☐ Very fast processors
- ☐ High-speed inter-processor communications
- ☐ Large shared memory space
- ☐ Large processor-to-memory bandwidth

IV. Networking Requirements:

Directions: Indicate in the tables your overall typical data transfer requirements for transferring information between your site and other sites over wide area networks (WANs) including the Defense Research and Engineering Network (DREN), Unclassified IP Routed Network (NIPRNet), and internet service provider (ISP) given the current computational and networking environment at your site. Be sure to indicate the number of times per year that your users expect to conduct file transfers. Please note that the file size should be specified in gigabytes and that level of security classification is request in classified tables.

Overall Data Transfer Requirements

Unclassified

Typical File Attributes	FY01	FY02	FY04	FY06
Size (GB)				
Frequency (transfers/yr)				
Maximum Acceptable Transfer Time (min)				

Classified

Typical File Attributes	FY01	FY02	FY04	FY06
Size (GB)				
Frequency (transfers/yr)				
Maximum Acceptable Transfer Time (min)				
Level of Classification				

1. Do you have any plans to do simultaneous computing[3] at multiple sites? ____ Yes ____ No

If you checked "Yes" in question 1, please describe the applications, estimated bandwidth, protocol, and frequency:

2. Do you have plans to use a remote center to do on-line visualization post-processing or other real-time applications?

____ Yes ____ No

If you checked "Yes" in question 2, please describe the applications, estimated bandwidth, protocol, and frequency:

[3] Simultaneous computing is defined as using multiple computational assets to attack a problem simultaneously so that high speed communications might be required.

3. Do you have a requirement for collaborative interactions over a wide-area network using an application like MBone?

____ Yes ____ No

If you checked "Yes" in question 3, please describe the applications, estimated bandwidth, protocol, and frequency:

V. Training Requirements:

1. What types of general training would make your project more productive when using DoD HPC resources, such as generic system tools, compilers, parallel programming environments, debuggers, code profiling and optimization tools, or operating systems? Indicate number of users for each type of training and the specific type of software for each category. **The number of users should not be greater than the number of users indicated on page 2.**

Training Types	Number of Users	Topic
System Tools		
Compilers		
Operating System		
Parallel Programming Environments		
Debuggers		
Code Profiling		
Optimization Tools		
Visualization Tools		
Discipline Specific		
Other (Specify):		

2. Indicate the **number of users** who require training on each of the following systems. Feel free to indicate any additional systems on which training would be beneficial to your users. Consider any other system specific training that would be useful for your users, such as aid in porting codes to new architectures. **The number of users should not be greater than the number of users indicated on page 2.**

System	Number of Users	Type of Training
Cray J90		
Cray T3E		
IBM SP		
IBM SMP		
Convex SPP Series		
Cray SV-1		
Cray T90		
SGI Onyx		
SGI Origin		
Compaq ES-40		
Sun E10000		
Other (Specify):		

CTA List and Descriptions

1. Computational Structural Mechanics (CSM)
   Computational Structural Mechanics (CSM) covers the high resolution multi-dimensional modeling of materials and structures subjected to a broad range of loading conditions including static, dynamic, and impulsive. CSM encompasses a wide range of engineering problems in solid mechanics such as linear elastic stress analysis, material or structural response to time dependent loading, large deformations, shock wave propagation, plasticity, frequency response, and nonlinear material behavior. High performance computing for CSM addresses the accurate numerical solution of the conservation equations, equations of motion, and constitutive relationships to model simple or complex geometries and material properties, subject to external boundary conditions and loads. CSM is used for basic studies in continuum mechanics, stress analysis for engineering design studies, and predicting structural and material response to impulsive loads. DoD application areas include conventional underwater explosion and ship response, structural acoustics, coupled field problems, space debris, propulsion systems, structural analysis, total weapon simulation, weapon systems' lethality/survivability (e.g., aircraft, ships, submarines, tanks), theater missile defense lethality analyses, optimization techniques, and real-time, large-scale soldier- and hardware in-the-loop ground vehicle dynamic simulation.

2. Computational Fluid Dynamics (CFD)
   The Computational Fluid Dynamics (CFD) CTA covers High Performance Computation whose goal is the accurate numerical solution of the equations describing fluid and gas motion and the related use of digital computers in fluid dynamics research. CFD is used for basic studies of fluid dynamics, for engineering design of complex flow configurations, for predicting the interactions of chemistry with fluid flow for combustion and propulsion, for interpreting and analyzing experimental data, and for extrapolation into regimes that are inaccessible or too costly to study. Work in the CFD CTA encompasses all velocity regimes and scales of interest to the DoD. The physics to be considered may entail additional force fields, coupling to surface physics and microphysics, changes of phase, changes of chemical composition, and interactions among multiple phases in heterogeneous flows. CFD has no restrictions on the geometry and motion of boundaries defining the flow.

   DoD application areas include multiphase and reactive flows for propulsion, safety, and warheads, incompressible turbulent separating flows such as those encountered in subsonic vehicles, pipe flows, and air circulation, supersonic/hypersonic reactive and unreactive flows for planes, missiles, and projectiles, flows with thermodynamic state changes including phase transition including dynamics of fluid discontinuities and their interaction with boundaries (e.g., for hypervelocity impact), moderate velocity heterogeneous flows such as those involving liquid interface effects and mixing (e.g., for engines and fire suppression), large and small amplitude flow interactions with structures, direct simulation monte carlo and plasma simulation for atmospheric re-entry, MEMS, and materials hardening, MHD for advanced power systems and weapons effects, and basic research in fluid dynamics including low-speed and boundary-layer flows including turbulence transition, flows including turbulence solved by Direct Numerical and Large Eddy Simulation methodologies, creeping, seeping, and porous flows including percolation.

3. Computational Chemistry and Material Science (CCM)
   The Computational Chemistry and Material Science CTA covers the computational research tools used to predict basic properties of new chemical species and materials which may be difficult or impossible to obtain experimentally such as: molecular geometries and energies, spectro-scopic constants, intermolecular forces, reaction potential energy surfaces, and mechanical properties. Within DoD, quantum chemistry and molecular dynamics methods are used to design new chemical systems for fuels, lubricants, explosive, rocket propellants, catalysts, and chemical defense agents. Also within DoD, solid state modeling techniques are employed in the development of new high-performance materials for electronics, optical computing, advanced sensors, aircraft engines and structures, semiconductor lasers, laser protection systems, advanced rocket engines components, and biomedical applications.

4. Computational Electromagnetics and Acoustics (CEA)

   The Computational Electromagnetics area covers the high resolution multi-dimensional solutions of Maxwell's equations. DoD applications include calculating the electromagnetic fields about antenna arrays, the electromagnetic signatures of tactical ground, air, sea and space vehicles, the electromagnetic performance and design factors for EM gun technology, the electromagnetic signature of buried munitions, high power microwave performance, as well as the interdisciplinary applications in magnetohydrodynamics and laser systems.

   The Computational Acoustics area covers the high-resolution multi-dimensional solutions of the acoustic wave equations in solids, fluids, and gases. DoD applications include the modeling of acoustic fields for surveillance and communication, seismic fields for mine detection, and the acoustic shock waves of explosions for anti-personnel weapons.

5. Climate/Weather/Ocean Modeling and Simulation (CWO)

   The Climate/Weather/Ocean Modeling and Simulation CTA is concerned with the accurate numerical simulation of the earth's climate and the simulation and forecast on the important space and timescales of oceanic variability (e.g., temperature, salinity, currents, tides, waves, ice motion and concentration, sediment transport, optical clarity, etc.) and atmospheric variability (e.g., temperature, winds, pressure, relative humidity, cloud cover, precipitation, storms, aerosols and trace chemicals, surface fluxes, etc.) for both scientific understanding and DoD operational use. Numerical simulations and forecasts are performed from the very top of the atmosphere to the very bottom of the ocean. CWO includes the development of numerical algorithms for the assimilation of in-situ and remotely sensed observations into numerical forecast systems.

   CWO is used on a daily basis within DoD for safety of flight, search-and-rescue, mission planning (air, ground, sea, and space), electro-optical propagation, optimal aircraft and ship routing, anti-submarine and undersea warfare, and weapon system design.

   This CTA will provide DoD with: (1) high resolution weather and sea state forecasts leading to incisive decision making and enhanced operational capability in adverse weather with reduced weather related damage and fuel cost; (2) realistic simulations of the dynamic oceanic and atmospheric environment to permit effective mission planning, rehearsal and training, and more effective materiel acquisition; and (3) improvement in the capability to predict magnetic storm induced outages of C3, surveillance, and navigation systems.

6. Signal/Image Processing

   The Signal/Image Processing CTA covers the extraction of useful information from sensor outputs in real time. DoD applications include surveillance, reconnaissance, intelligence, communications, avionics, smart munitions, and electronic warfare. Sensor types include sonar, radar, visible and infrared images, and signal intelligence (SIGINT) and navigation assets. Typical signal processing functions include detecting, tracking classifying, and recognizing targets in the midst of noise and jamming. Image processing functions include the generation of high-resolution low-noise imagery and the compression of imagery for communications and storage.

   The CTA emphasizes research, evaluation, and test of the latest signal processing concepts directed toward these embedded systems. Usually such processors are aboard deployable military systems and hence require ruggedized packaging and minimum size, weight, and power. System affordability is expected to improve an order of magnitude through the development of scalable codes running on flexible HPC systems. This will enable the traditional expensive military-unique 'black boxes' required to implement high-speed signal/image processing to be replaced by COTS HPC-based equipment.

7. Forces Modeling and Simulation/C4I (FMS)

   The Forces Modeling and Simulation/C4I CTA covers (1) the use of command, control, communications, computers, and intelligence (C4I) systems to manage a battle space; (2) the use of large-scale simulations of complex military engagements to facilitate mission rehearsal/training, mission planning, and post-mission analysis; (3) the use of collaborative planning to support real-time decision making; and (4) the use of digital library technology for support of FMS/C4I research and development activities.

Across the DoD the variety of applications is large - with remarkable diversity of purpose, scope, resolution, emphasis, and time of effect. Common technology threads include object oriented, distributed parallel, highly compute and communications intensive, and time sensitive attributes. Applications exist in design, development, test, evaluation, deployed systems, and training systems.

8. Environmental Quality Modeling and Simulation (EQM)

The Environmental Quality Modeling and Simulation CTA covers the high-resolution three-dimensional Navier-Stokes modeling of hydrodynamics and contaminant and multi-constituent fate/transport through the aquatic and terrestrial ecosystem and wetland subsystems, and their coupled hydrogeologic pathways, and their interconnections with numerous biological species. Within DoD, this technology is used for stewardship and conservation of natural and cultural resources, optimal design and operation of installation restoration, and enhancement alternatives and development of short- and long-term strategies for integrated management in support of installation environmental quality. Also of interest to DoD is work in the area of noise evaluation and abatement as well as water quality models.

9. Computational Electronics and Nanoelectronics (CEN)

The Computational Electronics and Nanoelectronics CTA covers High Performance Computation for the accurate design and efficient numerical modeling and simulation of complex electronic devices, integrated circuits, and super components. Generally, the goal of research in this area is to lower the cost and/or enable improved performance of DoD electronics through a variety of CAD/CAE and predictive modeling and simulation techniques such as: (1) linear and nonlinear analysis; (2) time- and frequency-domain modeling; (3) physics-based transport, diffusion, and tunneling in semiconductors; (4) quantum transport in 'designer' electronic materials; (5) electromechanics; and (6) structural analysis of microelectronics including effects of electrostatics, magnetostatics, acceleration, vibration, and mass-loading.

Areas of investigation of interest to DoD include: (1) analog/digital high-frequency circuit and device simulation and optimization; (2) modeling and simulation of micro-electromechanical devices and micro-resonators; (3) computational EM/numerical methods for active and passive microwave and millimeter-wave circuits and structures; (4) analysis of coupled nonlinear devices; (4) noise and stochastic modeling; (5) electronic/ photonic interconnect and packaging analysis; (6) neural networks and formal design methods; (7) statistical analysis, design, and synthesis; (8) design-for-test; and (9) fault modeling.

10. Integrated Modeling and Test Environments (IMT)

The Integrated Modeling and Test Environments (IMT) CTA addresses the application of integrated modeling and simulation tools and techniques with live tests and hardware-in-the-loop simulations for the testing and evaluation of DoD weapon components, subsystems, and systems in virtual and composite virtual/real environments. DoD application areas focus on multi-disciplinary computational methods and real-time techniques and include digital scene generation, six degree-of-freedom trajectory simulations, real-time test-data analysis and display systems for test control and evaluation, and other modeling and simulation integration tools requisite to high fidelity engineering and closed-loop engagement models (one-on-one and few-on-few) for the simulation of weapon components, subsystems, and systems in a virtual operational context.

Computational Functions Definitions

<u>Non-Real-Time Computing (NRTC)</u> includes any type of batch or related interactive processing of computations involving modeling, simulation, and analysis where the computational resources are shared during the processing and are not totally dedicated to the computational task at hand. Tasks can be interrupted or stopped, analyzed, and then resumed, either at the termination point or at some previously saved interim point, in order to complete the calculation with the potential of changing analysis parameters.

<u>Real-Time Computing (RTC)</u> encompasses the acquisition and/or production of test, experimental, or simulation data and the concurrent processing of that data to extract information or for interactive display and/or control purposes. Inherent to the definition is the presence of some external stimulus, whether it be data produced by an ongoing test, a human operator waiting to make a decision required by an ongoing process, or a personnel and hardware participating in an interactive simulation. RTC is often dominated by hardware driven I/O processes rather than computational processes, but one of its major challenges is to apply the extensive computational power offered by HPC systems to perform increasingly sophisticated real-time analysis and display to impact an ongoing test, simulation, or experiment.

Available HPCMP Systems

HPCMO Site and System(s)	Peak Speed (GF)
ARL Origin	0.400
ARL Sun E10000	0.672
ARL T90	1.800
ASC Origin	0.400
ASC SP	0.540
ASC SMP/Power 3	0.800
ASC COMPAQ Regatta	1.203
ERDC Origin	0.400
ERDC T3E	1.200
ERDC SP	0.573
ERDC SMP/Power 3	0.800
NAVO J90	0.200
NAVO T90	1.800
NAVO T3E	0.900
NAVO Origin	0.400
NAVO SV1	1.000
AEDC SPP-2000	0.720
AEDC Origin	0.400
AHPCRC T3E	1.200
ARSC T3E	0.900
ARSC J90	0.200
AAC Onyx	0.390
AAC Origin	0.400
AFRL Paragon	0.075
MHPCC SP2	0.267
MHPCC P2SC	0.608
NAWC-AD PCA	0.390
SSCSD Exemplar	.0720
SSCSD Paragon	0.075
NRL Sun Ultra	0.333
NRL Exemplar	0.720
NRL Origin	0.500
RTTC Origin	0.400
SMDC Origin	0.400
TARDEC PCA	0.390
WSMR Origin	0.500